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Nursing process used in a user with pneumonia due to SARS-CoV-2 diagnosis

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ABSTRACT

Introduction: After the pandemic due to SARS-CoV-2, the participation of the professional nursing has been a core part of the success in the healthcare of users who have been diagnosed with COVID-19, due to a high mortality rate worldwide. The use of internal nursing methodologies makes the difference for a better clinical reasoning, thus assuring a diagnostic and therapeutic accuracy. **Objective:** Present a proposal of nursing care following methods and resources of the own nursing discipline. **Methodology:** The nursing process as intervention method and the taxonomies of NANDA, NOC, and NIC were used. The accuracy of the diagnosis was estimated through the Lunney's Accuracy of Nursing Diagnoses Scale and the prioritization of diagnosis with the reasoning network of the AREA model. **Presentation of the case:** Female user of 67 years of age diagnosed with pneumonia due to SARS-CoV-2 who entered to the intensive therapy unit after twelve days of hospitalization in internal medicine and seven days of invasive ventilation support with sedoanalgesia. **Conclusions:** The applications of the nursing process and complementary resources allowed obtaining more precise diagnoses, their prioritization, and the development of the development of the therapeutic judgment during intervention.

Health descriptors: Nursing process; planning the healthcare to the patient; coronavirus infection (DeCS; BIREME).

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Proceso de enfermería a usuaria con diagnóstico de Neumonía por SARS-CoV-2

RESUMEN

Introducción: Tras la pandemia por el virus SARS-CoV-2 la participación de la enfermería profesional ha sido parte medular del éxito en la atención de usuarios diagnosticados con COVID-19 debido a la alta tasa de mortalidad a nivel mundial. El uso de metodologías propias de enfermería marca la pauta para un mejor razonamiento clínico asegurando así una precisión diagnóstica y terapéutica. **Objetivo:** Presentar una propuesta de cuidado enfermero siguiendo métodos y recursos propios de la disciplina enfermera. **Metodología:** Se empleó el proceso de enfermería como método de intervención, las taxonomías de la NANDA, NOC y NIC. La precisión de los diagnósticos se estimó a través de la Escala de Precisión de Diagnósticos de Enfermería de Lunney y la jerarquización de diagnósticos con la red de razonamiento clínico del modelo AREA. **Presentación del caso:** Usuario femenino de 67 años diagnosticado con Neumonía por SARS-CoV-2 que ingresa al servicio de Terapia Intensiva tras doce días de hospitalización en Medicina Interna y siete días de apoyo ventilatorio invasivo con sedoanalgesia. **Conclusiones:** La aplicación del proceso de enfermería y recursos complementarios permitieron que se obtuvieran diagnósticos más precisos, su jerarquización y el desarrollo del juicio terapéutico al intervenir.

Descriptores de salud: Proceso de enfermería; Planificación de atención al paciente; Infecciones por coronavirus (DeCS; BIREME).

Processo de enfermagem utilizado em um usuário com pneumonia devido ao diagnóstico de SARS-CoV-2

ABSTRATO

Introdução: Após a pandemia devido à SARS-CoV-2, a participação do profissional de enfermagem tem sido uma parte essencial do sucesso na assistência à saúde de usuários que foram diagnosticados com COVID-19, devido a uma alta taxa de mortalidade em todo o mundo. A utilização de metodologias internas de enfermagem faz a diferença para um melhor raciocínio clínico, garantindo assim uma acurácia diagnóstica e terapêutica. **Objetivo:** Apresentar uma proposta de cuidado de enfermagem seguindo métodos e recursos da própria disciplina de enfermagem. **Metodologia:** Utilizou-se o processo de enfermagem como método de intervenção e as taxonomias NANDA, NOC e NIC. A acurácia do diagnóstico foi estimada por meio da Escala de Precisão de Diagnósticos de Enfermagem de Lunney e a priorização do diagnóstico com a rede de raciocínio do modelo AREA. **Presentation of the case:** Female user of 67 years of age diagnosed with pneumonia due to SARS-CoV-2 who enters to the intensive therapy unit after twelve days of hospitalization in internal medicine and seven days of invasive ventilation support with sedoanalgesia. **Conclusions:** The applications of the nursing process and complementary resources allowed obtaining more precise diagnoses, their prioritization, and the development of the development of the therapeutic judgment during intervention.

Descritores de saúde. Processo de enfermagem; planejar o cuidado ao paciente; contágio do coronavírus (DeCS; BIREME).

INTRODUCTION

On March 11, 2020, the World Health Organization (WHO) informed about the presence of the pandemic caused by the SARS-CoV-2 virus or COVID-19. Up to October 24, at domestic level, 886,800 total cases have been confirmed and 88,743 total deaths due to COVID-19. In Sonora, up to the same date there have been 37,338 accumulated cases, this placed Sonora among the first ten states with the highest number of cases[2]. The main factors that increase the severity of COVID-19 are chronic-degenerative illnesses such as diabetes mellitus, high blood pressure, overweight, and obesity; the state of Sonora has the first places in national prevalence of these conditions[3].

Nowadays, nursing is of particular importance, since as part of the multidisciplinary health team, it permanently provides healthcare sustained on a scientific basis with an integral vision, which makes it leader to face all situations with ethics and different approaches, e.g., administrative, investigative, academic, and healthcare, both in clinical and community environments[4].

In the case of COVID-19 patients, nursing healthcare, specifically in critical patients, has the objective to treat nursing diagnosis, early identification of complications, and prevent the transmission in high risk population[5]. Additionally, nursing is the main support for the users since they are completely isolated from their family and environment, generating feelings such as fear and anxiety before the death risk. The purpose of this study is to present a healthcare proposal to a user with the medical diagnosis of pneumonia due to SARS-CoV2, using as intervention method the nursing process, the standardized nursing languages, and tools such as the AREA Model and the Lunney's Accuracy of Nursing Diagnoses Scale.

METHODOLOGY

The nursing care of Mrs. CMM was implemented in a private institution of tertiary care in the northeast part of Mexico during 45 days. The nursing process was used as intervention method[6-8]. The pattern of For the nursing assessment, the Marjory Gordon's functional health patterns were used[9,10]; the diagnosis, results, and interventions were prepared making use of the nursing standardized language, namely, the taxonomy of the North American Nursing Diagnosis Association (NANDA)[11-14,18], the taxonomy of the Nursing Outcomes Classification (NOC) [15,16,18] and the taxonomy of the Nursing Interventions Classification (NIC)[13,17,18]. The accuracy of the nursing diagnosis was estimated through the Lunney's Accuracy of Nursing Diagnoses Scale (EPDE by its acronym in Spanish)[19,20]. The prioritization of the diagnosis was established through a network of clinical reasoning of the model Analysis of Results of Current Status (AREA by its acronym in Spanish)[21-23]. The user and her family were requested the informed consent, giving the guarantee of confidentiality and anonymity of the information collected.

PRESENTATION OF THE CASE

CMM. 67 years old female patient, who came to a consultation on August 27 due to dyspnea of minimal efforts, fever, headache, productive cough, myalgia, arthralgia, back-eye pain and diarrhea. With the support of blood tests and chest CAT scanning, she was diagnosed with pneumonia due to SARS-CoV2, thus, she was hospitalized in the internal medicine service.

On September first a ventilation and neurologic deterioration is shown; invasive mechanical ventilation with endotracheal tube is started; she is subjected to sedoanalgecia with myorelaxation, and is placed in a ventral position. Twenty four hours later, she showed hemodynamic and oliguria instability; amines and vasodepressors and inotropics are started, and with the assistance of a transesophagic echocardiogram the lung thromboembolism is identified, so she is submitted to a thrombectomy trough intra-arterial fibrinolyse. Also, a Mahurkar catheter is placed to start the renal replacement therapy (hemodialysis).

On September third she suddenly showed swelling in the upper limbs, chest and neck; the tomography showed subcutaneous emphysema in the left area of the chest, pneumomediastinum, and subdiaphragmatic free air. Fasciotomy is carried out in the bilateral chest region generating the instantaneous escape of air and the gradual reduction of the subcutaneous emphysema. She was admitted in the intensive therapy unit on September eight, there she started with profuse bleeding in fasciotomy injuries; hematology confirms coagulopathy. However, given the fact that the bleeding is localized, it was proceeded to close the injuries for hemostasis. On September 20, a tracheotomy was performed due to the impossibility of a successful ventilation removal. Nursing assessment was performed on September 29, 2020.

Nursing assessment

Pattern: Health Maintenance-Perception

CMM lives in Hermosillo, Sonora. She is a merchant and housewife. She lives in her own house with basic services. She had an incomplete vaccination scheme, without specifying on it. She was diagnosed with hypothyroidism 40 years ago, and she is under treatment with levothyroxine, 50 mcq VO each 24 hours; type 2 diabetes mellitus, diagnosed 10 years ago, and controlled with linagliptin and metformin, 2.5/1000mg VO each 24h. The adherence to her treatment is not good. She mentioned allergies to acetyl salicylic acid. She denied the use of psychoactive substances.

The patient was observed in poor general status, with deficient hygiene. Medical treatment: metronidazole 500mg VO each 8h, omeprazole 40mg IV each 24h, budesonide with formoterol 160/4.5mcg inhaled each 12h, calcium gluconate 1gr IV each 12 h, lysine clonixinate 100mg IV each 8h, enoxaparin 60mg SC each 24h, olanzapine 10mg VO each 24h, ipratropium bromide with acetylcysteine 250/250mg nebulized each 8h, and vancomycin 125mg VO each 6h. She has parental nutrition N7 2000 ml + 1 vial of multivitamins + 1 gr of ascorbic acid for 84.17 ml/h and 16 mg of norepinephrine + 5% glucose solution, 100 ml per dose. It shows high risk of falls with 13 points in the Crichton scale. *Disfunctional pattern*.

Pattern: Nutritional-Metabolic

The patient had normal temperature, BMI of 30kg/m^2, dehydrated skin with reduced turgidity and slightly pale. Subhidrated oropharyngeal mucous membrane, dry lips, halitosis, has 6 teeth pieces, presence of plaque and dental cavities in every piece. Functional tracheostomy, functional, stoma with pink color, without secretion leak or infection. 5 cm chirurgical injuries in both pectorals with clear edges, without data of infection. She tolerates through mouth via, but avoids eating because of increased distention and peristalsis; she has tendency to hyperglycemia (173mg/dl seric glucose). She shows injuries by dependence of mixed type grade II[(24)] in the sacral-coccygeal and crease between checks of buttocks region of 5 cm of diameter and 2mm depth, covered with hydrocolloid patch; she shows hyperemia and inflammation in the skin of the periphery, with thickened edges; there is presence of macerated and necrotic tissue in the edges. In the center, the characteristics change to a category III injure due to pressure with total loss of the skin thickness; she also has necrotic tissue and two areas of .5cm each one of humid necrotic tissue. Limbs without swelling with compressive panty hoses. Total intake of 1270 ml in 7 hours. The lab results show anemia (Hb: 8.88 gr/dl), leukopenia (3.7110^3/ml), lymphopenia (0.98 10^3/ml), and hyponatremia (Na: 134mg/dl). *Disfuncional pattern*.

Pattern: Elimination

She has a #16 Foley type silicon urinary catheter, with urination of 134.2ml/h, dieresis every hour of 1.45ml/kg/h and total of 940 ml in the shift, urinary density of 1020. She has 15 days without renal replacement therapy through hemodialysi. Bristol 6 evacuation, greenish color and fetid odor with 3-5 evacuations per day (positive result to clostridium difficile GDH + A and B toxin in feces). Hyperactive

peristaltic noises of 8x´. abdomen with abundant adipose panicle, distended, and tympanic. Insensible losses of 322 ml in 7 hours (92 kg x 0.5 x 7 hours), giving a water balance of -42ml. Blood tests show 57.8 mg/dl of urea and 0.7 mg/dl of creatinine, and a glomerular filtration rate of 89.7 ml/min/1.73 m^2. *Disfuncional pattern.*

Pattern: Activity-Exercise

Vital signs: Hear rate of 89x´, arterial blood pressure 125/62mmHg, arterial tension 86mmHg, Fr 36x´, SaO2 of 100% with mask support with a T piece to 40% of intermittent FiO_2, with VM in spontaneous mode each 3 hours PEEP 6 cm H_2O, PS 8, and FiO_2 to 30%. Lung fields with bilateral apical wheezing, productive cough with moderate amount of secretions, dense and greenish, of difficult expectoration. With tendency to tachycardia, polypnea, and dyspnea to the minimum effort. Central vein catheter in left subclavian 8.5 Fr of 4 lumens, without infection data to 28 days of installation. Dependent on norepinephrine at very low doses (0.0056 mcg/kg/min), without tolerance to its withdrawal since she shows reduction of mean arterial pressure up to 55mmHg.
Complete limbs, capillary filling of 4s, and incomplete capacity of mobility since she can only move hands and the toes of both feet. Reduce strength and twitching in thoracic and pelvic members (Degree 2 in Daniels Scale). Currently, she is in a recliner chair to which she was transferred with total support of the health personnel. The last arterial blood gas shows metabolic acidosis fairly compensated (pH 7.34, pCO_2 32.90mmHg, pO_2 51mmHg, Eb -8.2, HCO_3 17.8mmol/L, carbon dioxide 18.8 mmol/L, spO_2 83%) and a Kirby Index of 196 (PaO_2=59/FiO_2 30% *100), which indicates alteration in the ventilation/perfusion that requires more contribution of O_2. *Disfuncional pattern*

Pattern: Sleep-Rest

CMM mentioned that her sleep quality is low, she has difficulty to sleep, requires drug support. Her sleep is interrupted due to nursing care, most of the day she feels tired and sleepy. Recently she has shown changes of humor and sometimes she refuses receiving healthcare. *Disfunctional pattern*.

Pattern: Cognitive-Perception

She is alert, oriented in her three spheres, pupil diameter within normal ranges, and symmetric. Reduced visual acuity, using external aids since 20 years ago due to astigmatism and hyperopia. Her speak capacity is currently affected by the tracheostomy; she communicates through signs and lip and face movements. She mentions acute pain of somatic type with a score of 8 according to the analogical visual scale (EVA by its acronym in Spanish) in buttocks due to injury due to dependency which decreases with nonsteroidal anti-inflammatory drugs. *Disfunctional pattern.*

Pattern: Self-perception and concept of herself

CMM considers herself a happy person, although the perception of her body image is negative, since she feels she is "too fat"; she is happy with her personality, however, she is afraid of not being able to speak anymore and permanently loose physical mobility. As consequence of her hospitalization and complications of her illness, she has passed through demotivation and flat periods. *Disfunctional pattern*.

Pattern: Role-Relationships

The patient is married with three children, with whom she has good relationship. CMM lives with her husband and daughter; the couple provides for the house, thus, she worries for her reduction in motor capacity. She knows she has the support of family and friends. *Potentially dysfunctional pattern*.

Pattern: Sexuality-Reproduction:

Menarche when she was 13 years old; she began to have an active sexual life when she was 17; 3 pregnancies, 2 childbirths, and 1 cesarean delivery. She had a mammography and cervico-vaginal exam last year without reporting any alteration. Menopause began when she was 50 years old. There

was no alteration data to the physical exploration. *Functional pattern*.

Pattern: Coping and Stress Tolerance

CMM mentioned some difficulties to adapt to the limitations of her new situation, mainly to the reduction of motor skills; she channels her stress and fear with rage periods, due to frustration that generates on her being completely dependent. *Disfunctional pattern*.

Pattern: Values-Beliefs

She is Catholic, which plays an important role in her life since it provides solace, strength and hope towards her current situation. Death, which is her worst fear, is always present these days. She mentioned that her husband and children give sense to her life and are her worst concern in case she dies. *Potentially dysfunctional pattern.*

Nursing Diagnosis (DE)

In order to estimate the diagnostic accuracy 13 DE were integrated, and Lunney's[19,20] ACDE was used, through which eight DE with high accuracy (Figure 1) were selected; therefore, it was decided to design the healthcare plan and work on these eight diagnostics. The priority of high accuracy DE was established through the AREA[21-23] model (Figure 2).

Healthcare Plan

Next, the healthcare plan is shown. In this plan, five DE are included, which, according to Lunney's[19,20] ACDE (Figure 1, column 2) and the priority of the AREA[21-23] model are relevant for the current health status of the user. Three nursing diagnostics that equally are relevant for the condition of the patient, are not included in the proposal due to space matters. Additionally, the healthcare plan included the evaluation of the patient response to the nursing treatment implement.

Nursing diagnosis: (00030) Impaired gas exchange r/c imbalance in ventilation-perfusion m/p abnormal arterial blood gases (moderately compensated metabolic acidosis, Kirby index of 196).							
Domain: 3 Elimination and exchange.			**Class:** 4 Respiratory function				
Nursing Outcome NOC: 0402 Respiratory Status: Gas Exchange Definition: Alveolar exchange of CO2 and O2 to maintain arterial gas concentrations.					Time to achieve the planned result: 10/01/2020		
Domain: Physiological health (II)			**Class:** Cardiopulmonary (E)				
◯ **Pre-intervention score:** 3 (Moderate deviation from normal range)			⇨ **Post-intervention score:** 4 (Slight deviation from normal range).				
Outcome target score: Maintain a: **Puntuación diana del resultado**: Mantener a:			**Increase to:** 4 Slight deviation from normal range. Aumentar a: 4 Desviación leve del rango normal				
Overall result score		Severe deviation from normal range 1	Substantial deviation from normal range 2	Moderate deviation from normal range 3	Slight deviation from normal range 4	No deviation from normal range 5	Not applicable
INDICATORS							
040208	Partial pressure of oxygen in arterial blood (PaO2)	1	②	3	⇨ 4	5	NA
040209	Partial pressure of carbon dioxide in arterial blood (PaCO2)	1	2	③	⇨ 4	5	NA
040210	Arterial pH	1	2	3	④	⇨ 5	NA
040211	O2 saturation	1	②	3	4	⇨ 5	NA
040212	Tidal volume CO2	1	2	③	⇨ 4	5	NA
040213	Radiographic (X-Ray findings)	1	2	③	⇨ 4	5	NA
040214	Ventilation/perfusion balance	1	②	3	⇨ 4	5	NA
		Severe	Substantial	Moderated	Slight	None	
040203	Resting dyspnea	1	②	3	⇨ 4	5	NA
040204	Dyspnea on exertion	1	2	③	⇨ 4	5	NA
040205	Concern	1	2	③	4	⇨ 5	NA
040206	Cyanosis	1	2	③	4	⇨ 5	NA

Intervention NIC Intervention: 1911 Management of basic acid balance: metabolic acidosis Definition: To promote basic acid balance and prevent complications secondary to lower than desired serum HCO3 levels or higher than desired hydrogen ion levels.	
Domain: 2 Physiological: Complex	**Class: G** Electrolyte & Acid-Base Management
Activities: Maintain a patent respiratory tract. Monitor breathing pattern. / Monitorizar el patrón respiratorio. • Ensure patent I.V. access. Monitor possible etiologies before attempting to treat acid-base imbalances. Determine disorders that require direct intervention. Monitor HCO3 deficit causes.	• Provide proper nutrition. • Monitor electrolyte imbalances associated with metabolic acidosis. • Administer fluids as indicated for excessive losses. Monitor the determinants of tissue oxygen delivery. • Monitor for signs and symptoms of worsening HCO3 deficit. • Monitor inputs and outputs.
Evaluation (assessment): The result of the intervention was positive as the client went from moderate deviation from the normal range (3) in respiratory status and gas exchange, to mild deviation from the normal range (4). There is evidence of positive change (+1). The defining characteristics of the nursing diagnosis presented by the client improved.	

Intervention NIC: 1920 Acid-base balance monitoring Definition: Collection and analysis of patient data to regulate Acid-base balance.	
Domain: 2 Physiological: Complex	**Class:** G Electrolyte and Acid-base control
Activities: • Obtain samples for laboratory analysis of Acid-base balance. Analyze serum pH trends in patients with pH-increasing conditions. Observe whether the PaCO2 level indicates respiratory acidosis, respiratory alkalosis or normality.	• Identify possible etiologies before treating Acid-base imbalances, as it is more effective to treatment the etiology than the imbalance. Monitor for signs and symptoms of HCO3 deficit and metabolic acidosis. Change medical treatment to maintain the patient's parameters within the limits indicated by the physician, following established protocols.
Evaluation (assessment): The outcome of the nursing intervention was positive, moving from a preintervention score of moderate deviation from the normal range (3) in respiratory status and gas exchange, to mild deviation from the normal range (4). There is evidence of positive change (+1), reflecting the client's improved acid-base balance.	

Nursing diagnosis:(00031) Ineffective airway cleansing r/c artificial respiratory tract (tracheostomy) m/p bilateral apical rales, excessive sputum and dyspnea. **Diagnóstico de enfermería:**(00031) Limpieza ineficaz de las vías aéreas r/c vía aérea artificial (traqueostomía) m/p estertores apicales bilaterales, cantidad excesiva de esputo y disnea							
Domain: 11 Safety/protection			**Class:** 2 Physical injury				
Nursing Outcome NOC: (0410) Respiratory status: patency of airways **Definition:** tracheobronchial airways open, clear and clean for air exchange.					Time to reach the expected result: 30 min.		
Domain: Physiological health (II)			**Class:** Cardiopulmonary (E)				
◯ **Pre-intervention score:** 1 (Severe deviation from normal range)			⇨ **Post-intervention score:** 4 (Slight deviation from normal range)				
Outcome target score: Keep at**:** Increase to: 4 (Moderate deviation from normal range).							
Overall result score		Severe deviation from normal range 1	Substantial deviation from normal range 2	Moderate deviation from normal range 3	Slight deviation from normal range 4	No deviation from normal range 5	Not applicable
INDICATORS							
041004	Respiratory frequency	①	2	3	⇨ 4	5	NA
041005	Respiratory rate	1	2	③	4	⇨ 5	NA
041011	Inspiration intensity	①	2	⇨ 3	4	5	NA
041012	Ability to remove secretions	1	②	3	⇨ 4	5	NA
		Severe	Substantial	Moderated	Slight	None	
041002	Anxiety	1	②	3	4	⇨ 5	NA
041011	Fear	1	2	③	4	⇨ 5	NA
041007	Pathological respiratory sounds	①	2	3	4	⇨ 5	NA
041014	Gasp / Panting	1	②	3	4	⇨ 5	NA
041015	Resting dyspnea	1	2	③	⇨ 4	5	NA
041016	Slight exertional dyspnea	①	2	3	⇨ 4	5	NA
041019	Cough	1	②	3	⇨ 4	5	NA
041020	Sputum accumulation	①	2	3	⇨ 4	5	NA

Intervention NIC: 3180 Artificial airway management Definition: Maintenance of endotracheal tubes or tracheostomy tubes and prevention of complications associated with their use.	
Domain: 2 Physiological:: Complex	**Class:** Respiratory Management
Activities: Perform hand casting. Implement universal precautions. / Emplear precauciones universales. • Use personal protective equipment. Provide 100% humidification to inspired oxygen. Provide adequate systemic hydration by oral and intravenous administration. Inflate the tracheostomy balloon using a minimally leaky, minimally occlusive technique. Maintain tracheostomy balloon inflation at 15-20mmHg during mechanical ventilation and during and after feeding.	• Check tracheostomy balloon pressure every 4-8 hours during expiration with a manometer. Check the balloon pressure immediately after handling. / Comprobar la presión del globo inmediatamente después de manipulación. • Perform endotracheal suctioning. • Change the tracheostomy support every 24 hours. Auscultate for the presence of bilateral pulmonary sounds. • Provide tracheal care every 4-8 hours. • Inspect and palpate for the presence of subcutaneous emphysema every 8 hours. Elevate bed head 30º or more.
Evaluation (assessment): The outcome of the nursing interventions was positive as the client moved in airway patency from severe deviation from the normal range (1), to mild deviation from the normal range (4). Therefore, there is evidence of a positive change (+3), as most of the defining characteristics of the patient's airway patency were positive (+3).	

Intervention NIC: 3350 Respiratory monitoring Definition: Collection and analysis of patient data to ensure airway patency and adequate gas exchange.	
Domain: 2 Physiological: Complex	**Class:** Respiratory Management
Activities: Monitor the frequency, rhythm, depth and effort of breaths. • Evaluate thoracic movement. • Observe for stridor breathing or snoring. Monitor breathing patterns. / Monitorizar los patrones de respiración. • Monitor oxygen saturation levels. • Watch for diaphragmatic muscle fatigue. • Auscultate breath sounds.	• Determine the need for suctioning by auscultating for crackles or hoarseness in the main airway • Auscultate lung sounds after treatment to evaluate the results. • Monitor mechanical ventilator readings. • Monitor for increased restlessness, anxiety or dyspnea. • Check the patient's ability to cough effectively. • Record the onset, characteristics and duration of cough. • Monitor the patient's respiratory secretions.
Evaluation (assessment): The outcome of the nursing interventions was positive as the patient went from severe deviation from the normal range (1) to mild deviation from the normal range (4). Therefore, there is evidence of a positive change (+3), demonstrating that adequate respiratory monitoring is a fundamental part in patients with tracheostomy.	

Nursing diagnosis: (00029) Decreased cardiac output r/c altered afterload m/p hypotension, prolonged capillary inflow (4s).							
Domain: 4 Activity/rest			**Class:** 4Cardio-vascular/Pulmonary responses				
Nursing Outcome NOC: 0401 Circulatory status. Unobstructed, unidirectional blood flow at adequate pressure through the major vessels of the systemic and pulmonary circuits.					Time to reach expected result: 10/05/2020		
Domain: Physiological health (II)			**Class:** Cardiopulmonary (E)				
◯ **Pre-intervention score:** 3 (Moderate deviation from normal range**)**			⇨ **Postintervention score:** 5 (No deviation from normal range**).**				
Outcome target score: Keep at**:** Increase to: 5 (Moderate deviation from normal range).							
Overall result score		Severe deviation from normal range 1	Substantial deviation from normal range 2	Moderate deviation from normal range 3	Slight deviation from normal range 4	No deviation from normal range 5	Not applicable
INDICATORS							
040101	Systolic blood pressure	1	2	◯ 3	⇨ 4	5	NA
040102	Diastolic blood pressure	1	2	◯ 3	4	⇨ 5	NA
040103	Pulse pressure	1	2	◯ 3	4	⇨ 5	NA
040104	Mean blood pressure	1	2	◯ 3	⇨ 4	5	NA
040135	PaO2 (partial pressure of oxygen in arterial blood)	1	2	◯ 3	4	⇨ 5	NA
040136	PaCO2 (partial pressure of carbon dioxide in arterial blood)	1	2	◯ 3	4	⇨ 5	NA
040137	Oxygen saturation	1	2	3	4	⇨ ◯ 5	NA
040140	Urine output	1	2	3	⇨ ◯ 4	5	NA
040151	Capillary refill	1	2	3	4	◯ 5	NA
		Severe	Substantial	Moderated	Slight	None	
040107	Orthostatic hypotension	1	2	◯ 3	⇨ 4	5	NA
040113	Strange breathing noises	1	2	◯ 3	⇨ 4	5	NA
040123	Fatigue	1	2	3	◯ 4	⇨ 5	NA
040154	Paleness	1	2	3	◯ 4	⇨ 5	NA

Intervention NIC: 4150 Hemodynamic Control Definition: Optimization of cardiac rate, preload, afterload and contractility.	
Domain: 2 Physiological: Complex	**Class:** Tissue Perfusion Management
Activities: Perform a thorough evaluation of hemodynamic status. • Use multiple parameters to determine the clinical status of the patient. • Recognize the presence of early warning signs and symptoms indicative of hemodynamic system affected. • Monitor for signs and symptoms of volume and perfusion status problems.	• Auscultate lung sounds and heart noises. Administer vasoconstrictor drugs Monitor medication effects • Evaluate peripheral pulses • Monitor electrolyte levels • Check and record blood pressure, rate, heart rate and pulses • Monitor medication effects
Evaluation: The result of the interventions was positive, as the client went from a circulatory status with moderate deviation from the normal range (3) in the preintervention score to no deviation from the normal range (5) in the postintervention score. There is evidence of positive change (+2), thus improving the client's circulatory status and generating the disappearance of the defining characteristics of the client's nursing diagnosis.	

Nursing diagnosis: (00196) Dysfunctional gastrointestinal motility r/c immobility m/p, diarrhea, pain and distended abdomen and hyperactive peristaltic noises (8x').							
Domain: 3 Elimination/Exchange				**Class:** 2 Gastrointestinal function			
Nursing Outcome NOC: (1015) Gastrointestinal Function: Ability of the gastrointestinal tract to ingest and digest food, absorb nutrients, and eliminate waste products.						Time to achieve the expected result: 10/05/2020	
Domain: Physiological health (II)				**Class:** Digestion and nutrition (K)			
◯ **Pre-intervention score:** 2 (Substantially affected)				⇨ **Post-intervention score:** 5 (Not affected)			
Outcome target score: Keep at: Increase to: 5 (Not affected)							
Overall result score		Severely affected 1	Substantially affected 2	Moderately affected 3	Slightly affected 4	Not affected 5	Not applicable
INDICATORS / INDICADORES							
101501	Food/feeding tolerance	1	2	③	4	⇨ 5	NA
101524	Appetite	1	2	③	4	⇨ 5	NA
101503	Frequency of bowel movements	1	②	3	4	⇨ 5	NA
101504	Stool color	1	②	3	4	⇨ 5	NA
101505	Stool consistency	1	②	3	⇨ 4	5	NA
101506	Stool volume	1	②	3	⇨ 4	5	NA
101508	Abdominal noises	1	②	3	⇨ 4	5	NA
101527	Serum albumin	1	2	3	4	⇨ ⑤	NA
101528	Hematocrit	1	2	3	4	⇨ ⑤	NA
101529	Blood glucose	1	2	③	⇨ 4	5	NA
		Severe	Substantial	Moderated	Slight	None	
101513	Abdominal pain	1	②	3	4	⇨ 5	NA
101514	Abdominal distention	1	②	3	⇨ 4	5	NA
101517	Increased visible peristalsis	1	2	③	4	⇨ 5	NA
101521	Elevated white blood cell counts	1	2	3	4	5	N/A
101522	Decrease in white blood cell count	①	2	3	⇨ 4	5	N/A
101523	Differential white blood cell counts	1	②	3	⇨ 4	5	N/A
101531	Indigestion	1	2	③	4	⇨ 5	N/A
101532	Nausea	1	2	3	4	⇨ ⑤	N/A
101533	Vomiting	1	2	3	4	⇨ 5◯	N/A
101535	Diarrhea	①	2	3	⇨ 4	5	N/A

Intervention NIC: 0430 Bowel Control Definition: Establishment and maintenance of a regular pattern of bowel movements.	
Domain: 1 Physiological: Basic	**Class: B** Elimination Management
Activities: • Record the date of the last defecation. • Monitoring of bowel movements, including frequency, consistency, shape, volume and color. • Monitor bowel sounds. • Monitor for signs and symptoms of diarrhea, constipation and impaction.	• Note bowel problems, bowel routine and previous laxative use. • Evaluate fecal incontinence. • Decrease the intake of flatulent foods. • Evaluate the medication profile to determine the effects of the medication.
Evaluation: The outcome of the intervention was positive as gastrointestinal function was restored from substantially compromised (2) in the pre-intervention score to not compromised (5) in the post-intervention score. Therefore, there is evidence of a positive change (+3), as the defining characteristics of the nursing diagnosis presented by the client decreased or disappeared completely.	

Nursing diagnosis: (00155) Risk of falls w/d impaired mobility, altered blood glucose level (tendency to hyperglycemia).							
Domain: 11 Safety/Protection				**Class:** 2 Physical injury			
Nursing Outcome NOC: (1909) Fall prevention behavior: Personal or family caregiver actions to minimize risk factors that could lead to falls in the personal environment.					Time to achieve the expected result: 10/05/2020		
Domain: Health Knowledge and Behavior (IV)				**Class:** Safety (HH)			
◯ **Pre-intervention score:** 3 (Sometimes proven)				⇨**Post-intervention score:** 4 (Frequently proven)			
Outcome target score: Keep at : Increase to: 4 (Frequently demonstrated)							
Overall result score		Never proven 1	Rarely proven 2	Sometimes proven 3	Frequently proven 4	Always proven 5	Not applicable
INDICATORS							
190923	Call for assistance	1	2	3	⇨ ④	5	NA
190903	Install barriers to prevent falls	1	2	3	④	⇨ 5	NA
190901	Use assistive devices properly	1	2	③	⇨ 4	5	NA
190918	Uses ocular corrective devices	1	2	③	4	5	NA
190902	Provides mobility assistance	1	2	③	⇨ 4	5	NA
190919	Uses safe transfer procedures	1	2	③	4	⇨ 5	NA
190913	Adapts bed hight as required	1	2	3	④	⇨ 5	NA
190916	Controls restlessness/anxiety	1	②	3	⇨ 4	5	NA
190917	Use precautions when taking medications that increase the risk of falls.	①	2	3	⇨ 4	5	NA

Intervention NIC: 6490 Fall Prevention Definition: Establish special precautions in patients at high risk of injury from falls.	
Domain: 4 Safety	**Class: V** Risk Management
Activities: • Identify cognitive or physical deficits of the patient that may increase the likelihood of falls in a given scenario. • Identify behaviors and factors that affect fall risk. • Review history of falls with patient and family. • Provide the dependent patient with resources for assistance request.	• Identify features of the environment that may increase the risk of falls. • Securing the wheels of the bed and chair • Prevent unnecessary reorganization of the physical space. • Place the mechanical bed in the lowest position. • Assist in grooming at frequently scheduled intervals.
Evaluation: The result of the interventions was positive since in comparison with the score obtained before the interventions, which was sometimes proven (3), and the final score after the interventions, which was frequently proven (4), there is an improvement of +1, which shows that the user acquired a fall prevention behavior thanks to the activities carried out.	

Intervention NIC: 0226 Exercise therapy: muscle control Definition: Use of specific activity or exercise protocols to improve or restore controlled body movement.	
Domain: 1 Physiological: Basic	**Class:** B Activity & Exercise Management
Activities: **Actividades:** • Determine the patient's willingness to commit to an activity or exercise protocol. • Collaborate with physical, occupational and recreational therapists in the development and execution of an exercise programs. • Develop a sequence of careful daily activities to enhance the effects of specific exercise therapy. • Implement pain control measures before starting exercise/activity.	• Evaluate sensory functions. • To help maintain stability of the trunk and/or proximal joints involved in fine motor skills. • Provide sequential instructions for each motor activity while exercising. • Use tactile stimuli to lessen muscle spasm.
Evaluation: The result of the intervention was positive since the score went from sometimes proven fall preventive behavior (2) during the pre-intervention, to frequently proven after the nursing interventions. This represents a positive increase (+2), thus decreasing the client's vulnerability to fall or injury due to her impaired mobility.	

Intervention NIC: 2120 Management of hyperglycemia **Definition**: Prevent and treat higher than normal blood glucose levels.	
Domain: 2 Physiological: Complex	**Class: G** Electrolyte & Acid-Base Management
Activities: • Monitor blood glucose levels. • Monitor for signs and symptoms of hyperglycemia: polyuria, polydipsia, polyphagia, weakness, malaise, lethargy, blurred vision or headache. . • Monitor the presence of ketone bodies in urine. • Check arterial blood gases and electrolyte levels. Monitor blood pressure and pulse. • Insulin administration.	• Promote oral fluid intake. • Monitor water balance. • Maintain an Intra Venous line. • Intra Venous Fluid Administration. • Facilitate oral hygiene. • Identify possible causes of hyperglycemia. • Anticipate situations in which insulin needs will increase.
Evaluation: The result of the intervention was positive since the risk of falls in the client was reduced, as reflected in the score that goes from: sometimes proven (2) during the pre-intervention, to frequently proven (4) after the nursing interventions. This shows positive progress (+2).	

Nursing diagnosis: (0046) Impaired skin integrity r/c physical immobility, pressure and shearing and diarrhea m/p grade II mixed type dependency injury in inter gluteal region and pain (8 on VAS).							
Domain: 11 Safety/Protection			**Class:** 2 Physical injury				
Nursing Outcome NOC: 1101 Tissue integrity: skin and mucous membranes. Structural integrity and normal physiologic function of skin and mucous membranes.					Time to achieve the expected result: 10/05/2020		
Domain: Physiological Health (II)			**Class:** Tissue integrity (L)				
◯ **Pre-intervention score:** 1 (Severely affected).			⇨**Post-intervention score:** 4 (Slightly affected)				
Outcome target score: Keep at :			Increase to: 4 (Slightly affected)				
Overall result score		Severely affected 1	Substantially affected 2	Moderately affected 3	Slightly affected 4	Not affected 5	Not applicable
INDICATORS							
110101	Skin temperature	1	2	3	④	⇨ 5	NA
110102	Sensitivity	1	2	3	⇨ ④	5	NA
110103	Elasticity	1	2	3	4	⇨ ⑤	NA
110104	Hydration	1	2	③	⇨ 4	5	NA
110106	Perspiration	1	2	3	④	⇨ 5	NA
110108	Texture	1	2	③	⇨ 4	5	NA
110109	Thickness	1	2	③	⇨ 4	5	NA
110111	Tissue perfusion	①	2	⇨ 3	4	5	NA
110113	Skin integrity	①	2	⇨ 3	4	5	NA
		Severe	Substantial	Moderated	Slight	None	
110105	Abnormal pigmentation	1	②	⇨ 3	4	5	NA
110115	Cutaneous lesions	①	2	⇨ 3	4	5	NA
110117	Scar tissue	①	2	⇨ 3	4	5	NA
110119	Peeling of skin	1	2	③	⇨ 4	5	NA
110121	Erythema	1	②	3	4	⇨ 5	NA
110122	Paleness	1	2	3	④	⇨ 5	NA
110123	Necrosis	①	2	3	⇨ 4	5	NA
110124	Induration	①	2	3	⇨ 4	5	NA

Intervention NIC: 3520 Pressure Ulcer Care Definition: To facilitate the healing of pressure ulcers.	
Domain: 2 Physiological: Complex	**Class: L** Skin/Wound Management
Activities: **Actividades:** • Monitor color, temperature, edema, moisture and the appearance of the surrounding skin. • Keep the ulcer moist to promote healing. • Clean the skin around the ulcer with mild soap and water. • Clean the ulcer with the appropriate non-toxic solution, with circular movements, starting from the center.	• Apply a permeable adhesive dressing to the ulcer. • Apply ointments. • Change position every 1-2 hours to avoid extended pressure. • Use special beds and mattresses. • Ensure adequate dietary intake. • Monitor nutritional status.
Evaluation: The nursing interventions achieved improvement in skin integrity as demonstrated by the comparison of the preintervention score which was severely affected (1), to the postintervention score which is at slightly affected (4). There is a positive change score (+3), which shows that thanks to nursing care, skin integrity improved significantly.	

Intervention NIC Intervention: 840 Repositioning Definition: Deliberate positioning of the patient or a body part to promote physiological and/or psychological well-being.	
Domain: 2 Physiological: Complex	**Class: H** Drug Management
Activities: • Place a proper therapeutic mattress on top of the mattress. • Explain to the patient that you are going to rearrange the patient's position. • Encourage the patient to participate in position modifications. • Monitor oxygenation status before and after a patient repositioning. • Pre-medicate the patient before rearranging the patient position. • Provide appropriate support for the neck.	• Minimize friction and shearing forces when repositioning the patient. • Place supports in edematous areas. • Avoid placing the patient in a posture that increases pain. • Place a foot board on the bed. . • Perform the turns as indicated by the condition of the skin. • Develop a protocol for change of position. • Rotate the immobilized patient at least every 2 hours.
Evaluation: The nursing interventions achieved improvement in skin integrity as evidenced by the comparison of the preintervention score which was severely affected (1), to the postintervention score which is at slightly affected (4). There is a positive change score (+3), which shows that thanks to the changes in position the defining characteristics of the nursing diagnosis improved.	

Intervention NIC: 2210 Administration of analgesics Definition: Use of pharmacologic agents to decrease or eliminate pain.	
Domain: 2 Physiological: Complex	**Class: H** Drug Management
Activities: • Ensure a holistic approach to pain management. • Monitor pain in patients with communication disorders. • Determine the patient's comfort level and desired comfort level using the appropriate pain measurement scale. • Document all pain observation findings. • Check doctor's orders as to the medication, dosage and frequency of the prescribed analgesic. • Verify previous doses and routes of analgesic administration to avoid under- or over-treatment. • Verify the history of drug allergies.	• Select the appropriate analgesic or combination of analgesics when more than one is prescribed. • Determine analgesic selection and pain intensity. • Record the level of pain using an appropriate pain scale before and after analgesic administration. • Administer analgesics at the appropriate time to avoid peaks and valleys of analgesia, especially with severe pain. • Implement measures to reduce harmful stimuli in the patient's environment. • Evaluate the efficacy of the analgesic at regular intervals after each administration, but especially after the initial doses.
Evaluation: The outcome of the nursing interventions was positive as it can be seen that the previous score of severely affected (2) increased to mildly affected (4). This shows a positive increase of (+3) in the score, thus reflecting that the defining characteristic of expression to pain from 8 on the VAS scale increased to 2, thanks to the administration of analgesics.	

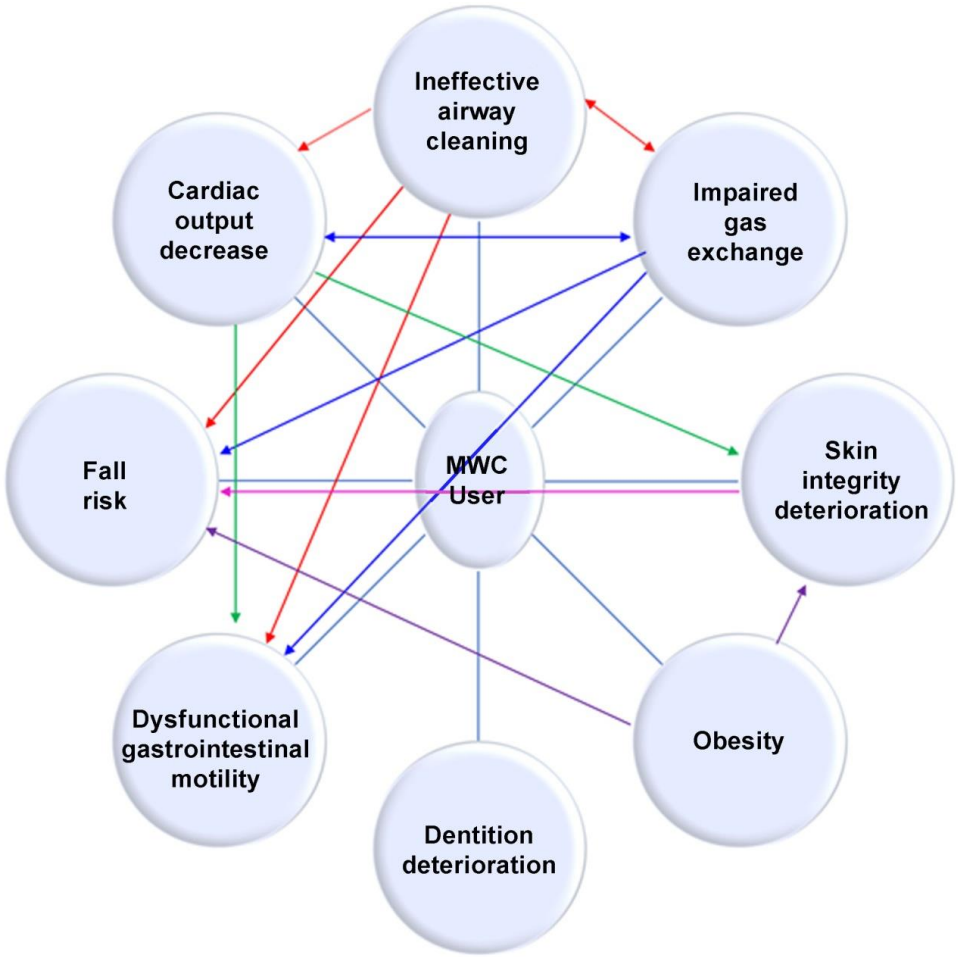
Figure 1. Nursing Diagnosis Accuracy Scale

NURSING DIAGNOSES	Data availability		Data relevance*.		Data specificity		Data		Does the diagnosis persist?		ACCURACY SCORE	ACCURACY CATEGORY **
	Yes (1)	No (0)	High/ Moderate (1)	Low (0)	High/ Moderate (1)	Low (0)	High/ Moderate (1)	Low jo (0)	Yes	No		
(00030) Impaired gas exchange r/c ventilation-perfusion imbalance m/p abnormal arterial blood gas (moderately compensated metabolic acidosis, Kirby index of 196)	1		1		3.5		8		YES		13.5	HIGH
(00031) Ineffective airway clearance r/c artificial airway (tracheostomy) m/p bilateral apical rales, excessive amount of sputum and dyspnea	1		1		3.5		8		YES		13.5	HIGH
(00029) Decreased cardiac output r/c altered afterload m/p hypotension, prolonged capillary refill (4 s)	1		1			0	8		YES		10	HIGH
(00155) Risk of falls w/d impaired mobility, impaired blood glucose level (tendency to hyperglycemia), diarrhea	1		1		3.5		8		YES		13.5	HIGH
(0046) Impaired skin integrity r/c physical immobility, pressure and shearing and diarrhea m/p mixed type II inter gluteal region dependency injury and pain (8 in VAS)	1		1		3.5		8		YES		13.5	HIGH
(00196) Dysfunctional gastrointestinal motility r/c immobility m/p, diarrhea, pain and distended abdomen and hyperactive peristaltic noises (8x')	1		1		3.5		8		YES		13.5	HIGH

(00048) Deterioration of dentition r/c difficult access to dental care, inadequate oral hygiene m/p tartar and caries, halitosis and partial anodontia	1			0	3.5		8		YES		12.5	HIGH
(00232) Obesity r/c daily physical activity less than recommended and energy expenditure less than energy consumption m/p BMI 30 kg/m2	1			0	3.5		8		YES		12.5	HIGH
(00195) Risk of electrolyte imbalance r/c diarrhea, affected regulatory mechanisms and insufficient fluid volume.	1			0		0		0		NO	1	LOW
(00034) Dysfunctional ventilatory response to weaning r/c history of ventilator dependence greater than 4 days m/p moderate increase in respiratory rate over baseline (36 x').	1			0		0		0		NO	1	LOW
(00043) Ineffective protection r/c abnormal hematologic profile m/p anemia and leukopenia.	1			0		0		0		NO	1	LOW
(00092) Activity intolerance r/c imbalance between oxygen supply and demand m/p exertional dyspnea and fatigue.	1			0		0		0		NO	1	LOW
(00203) Risk of ineffective renal perfusion r/impaired metabolism (urea 57.8 mg/dL).	1			0		0		0		NO	1	B LOW
*Relevance to the user's current condition. **Accuracy: Null = 0; Low = 1; Moderate = 2 to 5.5; High = 9 to 13.5.												

Source: Own development.

Figure 2. Clinical reasoning system



Source: Own development.

CONCLUSIONS

The implementation of the professional nursing care requires the use of methods and tools of the discipline itself. CMM's nursing care was subjected to the nursing process. Nursing taxonomies such as NANDA, NOC, and NIC and two other tools that promote the nursing clinical judgment, were used, namely, the Accuracy of Nursing Diagnosis Scale, which, through the diagnostic judgment allowed assessing the accuracy of nursing diagnosis; and the AREA model, which facilitated the identification of primary and secondary diagnosis. Moreover, a therapeutic judgment for the selection of the nursing treatment was implemented.

The implication of the critical thought in the nursing activity is inherent, likewise, the application of methods and tools of the discipline

itself are evidence of the intellectual processes that are reflected in the nursing interventions, promoting without doubt the autonomy of the nursing profession.
CMM left due to improvement and she expressed wellbeing and satisfaction for the nursing care she received. The participation of the nursing professionals in the treatment of the users who are diagnosed with COVID-19 is essential, given the fact that it is nursing the one that identifies on early stages the changes in the users' health status, as well as monitors them, implements specific treatments, and assesses their response.

CONFLICTS OF INTEREST

The authors stated that they do not have any conflict of interest.

FINANCING

None.

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